

## Supersaturation Lab

Name:

### Introduction:

Solubility is the extent to which one substance will dissolve in another. The substance being dissolved is called the solute. It is dissolved in the solvent. When the solvent is water, the result is called an aqueous solution.

The solubility of a substance in a particular solvent is affected by temperature, as shown in Reference Table G. A solution that holds the maximum amount of a given solute is called a saturated solution. This solution is very stable and is at equilibrium.

When a saturated solution is cooled, it can end up with more of the solute than it can hold at the new, cooler temperature. This solution is called supersaturated. A supersaturated solution is very unstable. The solute will precipitate out of the solvent very quickly if the solvent is disturbed, or if the solution is seeded with a few crystals of the solute substance.

### Procedure:

1. Place exactly 1.7 grams of the hydrate, sodium sulfate, in a clean test tube.
2. Using a graduated cylinder, add exactly 5 mLs of distilled water to the test tube.
3. Place the test tube in an approximately 50°C water bath.
4. Use a stirring rod to gently mix the solution, which will increase the rate of dissolving. Continue mixing until all of the substance is dissolved.
5. Remove the test tube and place it in an empty beaker for 2 minutes. Record your observations.
6. Gently remove the test tube and place in a beaker of ice water.
7. Wait 5 minutes. DO NOT DISTURB THE TEST TUBE!!!
8. Gently remove the test tube from the bath and gently dry the outside of the tube.
9. Add a few crystals of solid hydrate to the test tube. This will fill much less than the tip of your spatula. Record your observations,
10. Take your stirring rod and gently place it into the hydrated solution. Record your observations.

### Data Table:

	Observations
after initial heating	
after adding seeding crystal	

Questions:

1. What is the solute in the experiment? \_\_\_\_\_

2. What is the solvent in the experiment? \_\_\_\_\_

3. Why is it necessary to heat the mixture in step #4 of the procedure?

4. At the end of step #4, is the solution unsaturated, saturated, or supersaturated?

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Explain: \_\_\_\_\_

\_\_\_\_\_

3. At the end of step #7, is the solution unsaturated, saturated, or supersaturated?

\_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

4. At the end of step #9, when crystallization is complete, is the solution unsaturated, saturated, or supersaturated? \_\_\_\_\_

Explain: \_\_\_\_\_

\_\_\_\_\_

5. How could you test whether a solution is unsaturated, saturated or supersaturated?  
Explain how to interpret the results.

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6. Based on the results of this lab, what hypothesis could you develop relating the effect of the rate of cooling to the stability of a supersaturated solution?

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